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| 10/593,557 | 11/17/2006 | Yasuhiko Kasama | 8075-1111 | 4919 |
| 466 | 7590 | 10/21/2008 | EXAMINER | |
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| Suite 500 | | | | |
| ALEXANDRIA, VA 22314 | | | | 1792 |
| ART UNIT | | PAPER NUMBER | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/593,557 | KASAMA ET AL. |
| | Examiner | Art Unit |
| | MAKI A. ANGADI | 1792 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 17 November 2006.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-16 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-10 and 12-16 is/are rejected.
 7) Claim(s) 11 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 17 November 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>9/20/2006</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 11, does not show the correct units for the ion diameter. Accordingly claim 11 has not been further treated on the merits.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-9 and 12-16 are rejected under 35 U.S.C. 103(a) over Miley et al. (US Patent No. 6,171,451) in view of Fetherston et al. (US Patent No. 5,693,376).

As to claim 1, Miley discloses a material film production method (col.5, lines 6-11) comprises: generating plasma (Fig.1, col.6, lines 59-60) and target ions (col.6, lines 61-62); applying a control voltage (col.6, line 60) to an electric potential body/grid (col.6, line 61-64) in contact with plasma to control density of the target ions (col.7, lines 1-4); irradiating plasma towards deposition assistance substrate (Fig.2); applying a bias voltage (col.13, lines 52-67, claim 18) of a polarity opposite to that of the target ions with acceleration energies (col.9, lines 65-67, col. 10, lines 1-10). It is noted that the lower chamber region serves the roles of substrate to collect fullerene.

Miley discloses the formation of carbon nanomolecules but does not expressly disclose the process of implanting target ions into a material film. However, Fetherston discloses the process of plasma source ion implantation on a target surface with diamond like carbon film/coating (col.3, lines 5-10). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to select ion implantation of the material film or target because Fetherston illustrates that ion implantation of material film provides uniform coating into the inner bore or outer surface of a cylinder (col. 3, lines 1-3).

As to claim 2, Miley discloses a method of measuring an electric current between substrate (or wall chamber, 117, Fig.2) and a bias power supply for

applying bias voltage to measure density of target ions (col.13, lines 64-67 and col.14, lines 13-16).

As to claims 3 and 6, Miley discloses a material film production method (col.5, lines 6-11) that reads on the process of: generating plasma (Fig.1, col.6, lines 59-60) and target ions (col.6, lines 61-62); applying a control voltage (col.6, line 60) to an electric potential grid/body (col.6, lines 61-64) which would generate target ions and collision ions in the presence of gases (col.14, lines 48-53; irradiating plasma towards deposition assistance substrate (Fig.2); applying bias voltage (col.13, lines 64-67) to provide containment ions and collision ions (col.14, lines 1-9) and generate material molecules to internally contain target ions (col.14, lines 25-31)

As to claims 4-5, Miley discloses a material film production apparatus (Fig.2) for depositing film on substrate by plasma irradiation (col.6, lines 58-65).

As to claim 7, Miley is silent about the use of magnetic field for irradiating plasma towards the substrate. However, Fetherston discloses the use of magnetic bars (13) distributed about the outer periphery of the chamber wall (12) to generated magnetic field to influence ions generated by the plasma (col.5, lines 16-29, Fig.2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ magnetic field around

the plasma chamber employed by Miley because Fetherston illustrates that the presence of magnetic field will enhance ionization of gas molecules in the production materiel film (col.5 lines 28-39).

As to claims 8 and 12, Miley discloses that the materiel film comprises fullerene (col.5, lines 31-35) and collision ions are fullerene positive or negative ions depending on target substance, propellant gas and applied voltage (Fig.11, col.47-65).

As to claim 9, Miley discloses implantation target ions are cesium, argon, hydrogen, helium, nitrogen ions (col.14, lines 48-53).

As to claims 12-16 Miley discloses a material film production apparatus (Fig.2) comprising a vacuum vessel (111); plasma generation means for generating plasma (col.9, lines 55-57) including generating target ions (col.9, lines 65-67); collision ions (col.11, lines 36-48); an electric potential body to control density of ions by applying a control voltage (col.9, line 57); a substrate (in the lower chamber region, 125); bias power supply for applying bias voltage to measure density of target ions (col.13, lines 64-67 and col.14, lines 13-16); electric potential body (or wall structure) in a lattice pattern (Fig.9, lines 24-29); target molecules depositing on the substrate (Fig.6A, col.12, lines 4-23); fullerene ions that would include positive and negative ions because of the electrical

potential difference between the wall of the chamber 11 and the grid 112 (col.9, lines 65-67 and col.10 lines 1-10).

Miley is silent about the use of magnetic field generation means. However, Fetherston discloses the use of magnetic bars (13) distributed about the outer periphery of the chamber wall (12) to generate magnetic field to influence ions generated by the plasma (col.5, lines 16-29, Fig.2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ magnetic field lines around the plasma chamber employed by Miley because Fetherston illustrates that the presence of magnetic field will enhance ionization of gas molecules in the production of material film (col.5 lines 28-39).

Claim Rejections - 35 USC § 103

2. Claims 10 is rejected under 35 U.S.C. 103(a) over Miley et al. (US Patent No. 6,171,451) in view of Fetherston et al. (US Patent No. 5,693,376) as applied to claim 6, in further view of Takehara et al. (US pub. No. 2005/0129607).

Miley is silent about the use of target substance such as TTF, anthracene, pentacene etc. in the production of material film. However, Takehara discloses the use of anthracene, naphthalene and phenanthracene in the production of fullerene (paragraph 0022, 0045). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to select anthracene and other target material in the production of material film because

Takehara discloses that the hydrocarbon fuel such as anthracene reacts with oxygen to generate heat, thereby raising a gas temperature to a degree sufficient to produce material film such as fullerene (paragraph 0046).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Anazawa et al. (US Patent No. 6,902,655) discloses a producing apparatus and production method for manufacturing carbon structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MAKI A. ANGADI whose telephone number is (571)272-8213. The examiner can normally be reached on 8 AM to 4.30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Maki A Angadi/
Examiner, Art Unit 1792

/Shamim Ahmed/
Primary Examiner, Art Unit 1792